

REMARKS

Claims 1-103 are canceled. Claims 108 and 116 are amended. Claims 104-117 remain active and under consideration in this application.

Claims 104-117 stand rejected under 35 USC 103(a) as being unpatentable over Woodhouse (of record) and Kirk-Othmer (of record) as evidenced by John Deere (of record).

However, for the reasons that follow, none of these references, alone or in combination, discloses or suggests the claimed invention. The page numbers given below in the remarks refer to pages of references being discussed.

For clarity, the following gross distinctions are noted between Woodhouse and the claimed invention.

First, Woodhouse neither discloses nor suggests that addition of any salts of phosphoric acid or nitric acid must be added to salts of sulfamic acid under acidic conditions, let alone in the presence of phosphoric acid.

Second, Woodhouse does not mention use of acidic conditions for any reason whatsoever. To the contrary, given that Woodhouse emphasizes the use of nitrifying liquors, such as ammonia, in the disclosed compositions, one skilled in the art would readily comprehend that the Woodhouse compositions are, in fact, basic. Further, there is nothing in the disclosed compositions of Woodhouse that would suffice to neutralize the nitrifying liquors, let alone render them acidic. Thus, Woodhouse actually teaches away from the claimed invention as the former discloses and requires a basic-medium for the disclosed fertilizers.

Third, Woodhouse neither discloses nor suggests avoiding precipitation in order to obtain water-solution compositions. In fact, the Woodhouse compositions are not water-solution compositions, but rather are slurries or emulsions.

Having noted these gross distinctions, each is now examined in detail.

1. SALTS OF SULFAMIC ACID VS. SULFAMIC ACID AND SALTS OF SULFAMIC ACID?

The examiner has argued that “one of ordinary skill . . . as Woodhouse teach that sulfamic acid salts may be combined with other materials in preparing a fertilizer (p. 9).” This argument is incompatible with Woodhouse’s claims and specification. Partially to blame for this misinterpretation may be Woodhouse’s claims 5, 8, 9, 10 and 11 as a method of producing a fertilizer which comprises of acidic fertilizer materials and sulfamic acid and its salts, and the utilization of salts of sulfamic acid in the specification, including calcium and magnesium, to make nitrifying solutions or liquors. One must sort out what **type of sulfamate is available** in the Woodhouse specification and **what is actually used** in the reaction with superphosphates in Woodhouse’s claims and examples, and, finally, **whether bivalent metallic sulfamates are still available to mix with fertilizers**.

a) A careful examination of the Woodhouse’s nitrifying agent shows that claims of **sulfamic acid and salts of sulfamic acid refers to ammonium sulfamate, not bivalent metallic sulfamates**. Essentially, in Woodhouse, “*it is the object of this invention to provide a means for the preparation of improved **ammoniating solutions covering a wide range of free to fixed ammonia** . . .*” (p. 1, left column, ln 51-55).

b) In view of the object of invention and the definition of sulfamic acid and salts of sulfamic acid, Woodhouse further states that “*the sulfamic acid or salts thereof may be added alone (as **fixed ammonia containing material**) or before, during, or after*

*addition of other materials in preparing a fertilizer” (p. 1, right column, ln 41-44). It follows in Woodhouse that the preferred nitrifying liquor is made of “at least about 15 parts by weight of **sulfamic acid**, at least about 10 parts of **ammonia**, at least about 5 parts water and at least about 35 parts of a **water soluble salt** . . . selected from alkali metal, **alkaline earth metal** and ammonium salts such as ammonium nitrate, sodium nitrate, calcium nitrate, potassium nitrate, potassium chloride, or the like” (p. 2, right column, ln 36-53). Obviously, **such nitrifying liquors can only result in ammonium sulfamate.***

c) To specify sulfamic acid and salts of sulfamic acid as free to fixed ammonia containing material, Woodhouse states that “sulfamic acid or other salts of sulfamic acid may be **substituted** for and utilized equally as well as the **ammonium sulfamate.**” (p. 3, left column, ln 24-28). Note that Woodhouse points out “**all**” of the three examples **use ammonium sulfamate** in the superphosphate neutralization (p. 3, left column, ln 20-25).

d) Further to support sulfamic acid and salts of sulfamic acid uniqueness as ammonium sulfamate, Woodhouse states that “sulfamic acid or salts of sulfamic acid as **one constituent [ammonium sulfamate]**, nitrifying liquors can be obtained in which the ratio of fixed to free ammonia may be varied over a wide range (p. 1, right column, ln 30-34). And further, Woodhouse states that “nitrifying solutions or liquors may be prepared by the use of sulfamic acid or salts of sulfamic acid as **one component [ammonium sulfamate]** . . . (p. 1, right column, ln 10-18).

e) Since the essence of Woodhouse the invention is to provide ONE more superior ammoniating component/constituent to neutralize the acidic components of the superphosphate, Woodhouse states that “sulfamic acid may be used in ammoniating solutions or nitrogen-containing solutions which have incorporated therein a wide variety of nitrogenous compounds, including nitrates, such as sodium and calcium nitrate; ammonium salts of . . . organic nitrogenous materials . . .” (p. 2, left column, ln 46-59). Arguably, to neutralize the acid components of superphosphate Woodhouse’s object is

clearly ammonia as neutralizing agent, not sulfamic acid or other bivalent metallic salts of sulfamic acid.

f) In contrast, when Woodhouse refers to **calcium and magnesium sulfamates in the specification it is ONLY as “salts of sulfamic acid”**. Clearly, this is done to distinguish from sulfamic acid and its salts, i.e. ammonium sulfamate as the one constituent/component nitrifying solutions/liquors. In other words, Woodhouse may try to use salts of calcium and magnesium sulfamates as intermediate reagents to react them - displacement reaction - to a variety of sources of ammonia to produce ammonium sulfamate. The final product, sulfamic acid and salts of sulfamic acid, is unquestionably ammonium sulfamate.

g) Finally, Woodhouse **never made any claims or examples of bivalent metallic salts of sulfamic acid mixed or reacted with acidic fertilizer materials.**

Woodhouse's claims are nothing but methods to produce ammonium sulfamate. Thus, Woodhouse only claimed a fertilizer derived from an ammoniation reaction comprising sulfamic acid and salts of sulfamic acid (“ammonium sulfamate”) and acidic fertilizers (“superphosphate”). We will see next the difficulties in maintaining stable bivalent metallic salts of sulfamic acid, acidic fertilizer and ammonia.

2. DISPLACEMENT AND PRECIPITATION OF BIVALENT METALS. One of ordinary skill in the art would clearly notice the **low solubility of bivalent metals and phosphate and bivalent metals with phosphate and ammonia**. The main reason is ammonium/phosphate displacement of bivalent metals from sulfamates.

According to Casimer et al (US 3,416,910), in a ammonium/phosphatic slurry, Cu^{+2} from chelated EDTA reacts with Ca^{+2} , releasing Cu from the chelate, which Cu^{+2} would react with NH_4^+ and PO_4^{-3} . In contrast with the highly soluble copper sulfamate, the resulting **copper ammonium phosphate has low solubility and “would not leach out of the soil as readily”** (page 8, right side, ln. 51-58 and column ln 2-8). Further, at the pH 6-8

of the superphosphate, copper ammonium phosphate would have precipitated out from solution. No metallic sulfamate would be available in the Woodhouse's fertilizer.

Similarly, according to Brown et al (US 6,322,607), "***insoluble zinc ammonium phosphate ($ZnNH_4PO_4$) may be formed in the presence of ammonium ion and phosphate ion in the granulator . . . which is not available for crops, especially in sandy neutral or alkaline soils under dry conditions,***" and "***when a synthetic chelate such as ZnEDTA is mixed with phosphoric acid before ammoniation, acid decomposition of the chelate molecule results in decreased availability of some Zn fertilizers***" (column 1, ln 55-64). (Ksp of magnesium ammonium phosphate at 25C is 3×10^{-13} and Ksp for ferrous ammonium phosphate is 1.8×10^{-11} at pH 2). Again, no metallic sulfamate would be available in the Woodhouse's fertilizer.

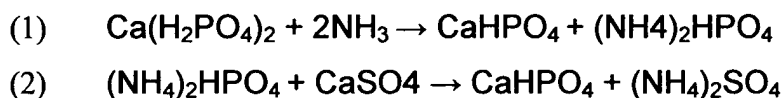
3. ACIDIC MIXTURE AND PRECIPITATION OF PHOSPHATE SALTS. The examiner merely assumes that **acidic environment is sufficient for stable fertilizer composition, however, this assumption is erroneous** (see page 10). For instance, magnesium ammonium phosphate ("struvite") may cause kidney stone in human and animals and, to avoid formation of its crystals, the recommended pH range in urine is from 5.9 to 6.3. Similarly, pH must be 5-6 to solubilize tricalcium phosphate. As we can see from these and the above examples, even **under acidic conditions**, a mixture of ammonia, bivalent metals and acidic components of superphosphate can cause **bivalent metallic ammonium phosphate or metallic phosphate precipitation**.

4. AMMONIUM SULFAMATE AS REAGENT OF REACTION. Sulfamic acid and salts of sulfamic acid are ammonium based reagents intended to react with the acid components of phosphatic material to derive other ammonium salts, including ammonium sulfate.

In Woodhouse, **ammonium sulfamate** is reacted out with some of the components of the superphosphate. That is, "***ammonium liquid with suitable proportions of superphosphate or mixed fertilizers containing phosphatic materials . . . and the***

*proportions dependent upon the **desired chemical composition of final product** . . . compared with processes involving the separate addition of the same ingredients, a **lower temperature on ammoniation of the product results*** (page 2, right side, ln 25-35). Clearly, the addition of an ammonium liquor to phosphatic materials results in **ammonium sulfate and the reaction is exothermic**. In contrast, to dissolve nitrates and phosphates, including ammonium nitrates and monopotassium phosphate, in water to acidic solution with salts of sulfamate one must **add heat** to solution, preferably from 20C to 50C.

5. AMMONIUM SULFATE AS PRODUCT OF REACTION. The basic reaction of the **ammoniation of superphosphate** is given by:



In Woodhouse, **ammonium sulfamate** is reacted out with some of the components of the superphosphate. That is, “*ammonium liquid with **suitable proportions of superphosphate or mixed fertilizers containing phosphatic materials** . . . and the proportions dependent upon the **desired chemical composition of final product** . . . compared with processes involving the separate addition of the same ingredients, a **lower temperature on ammoniation of the product results*** (page 2, right side, ln 25-35). Clearly, the addition of an ammonium liquor to phosphatic materials results in **ammonium sulfate**.

Regardless of the use of alkaline earth salts, including Ca and Mg sulfamates, sulfamic acid and ammonia, the **ammoniation of superphosphate results in ammonium sulfate, no metallic sulfamate is available!**

6. REACTION FOLLOWED BY MIXTURE. In Woodhouse, the **preparation** of the fertilizer requires **three** steps. First, preparing a liquor containing various proportions of sulfamic acid, ammonia and water (the “**ammonia liquor**”). Second, this liquor is then

mixed [**reacted**] with phosphatic materials (the “**ammoniation of superphosphate**”). Third, only then the resulting product is **mixed** with additional fertilizer materials, such as potash salts and the like (page 2, left side, ln 24-36). Again, this shows **ammonium sulfamate is a reagent** used in the preparation of **ammonium sulfate**.

7. WHY AMMONIUM SULFAMATE? In Woodhouse, ammonium sulfamate provides a **wide range of free ammonia** (page 1, right side, ln 30-34) in contrast with other sources of ammonium, which have limited solubility in low temperatures (page 1, left side, ln 42-51). According to Woodhouse, *“it is the object of this invention to provide a means for the preparation of improved ammoniating solutions covering a **very wide range of free to fixed ammonia** (page 1, ln 52-55).”*

8. OTHER USES FOR MAGNESIUM SULFAMATE. The use of **alkaline and magnesium** is well known to **maintain contaminants from precipitating out after long storage**. According to Caldwell (US 5,683,075), the addition of alkali metal salt may precipitate any fluorine component of the phosphatic salt as potassium fluosilicate (column 2, ln 22-24). According to Datin (US 2,874,036), **magnesium salt minimizes the formation of fluorapatite** (column 3, ln 23-25). In Richmond and Casimer (US 3,507,641), 0.10-0.50 percent by weight of **magnesium oxide is added to the slurry to further improve its suspension characteristics** (column 10, line 42-45). US 4,383,846 to Newsom teaches use of N-substituted sulfamic acids to flocculate magnesium salts from fertilizers derived from the ammoniation of phosphoric acids. The metallic carbonaceous particles are flocculated and float to the surface, leaving a clarified liquid below, free of metals, after treatment with surfactants based on N-substituted sulfamic acids.

9. AMMONIUM SULFAMATE ESSENTIAL? Though Woodhouse equates sulfamic acid and its salts to ammonium sulfamate or equivalent ammonium salts. That, *“the **sulfamic acid or salts thereof may be added alone (as fixed ammonia containing material)**”*. (page 1, right side, ln 41-43). Woodhouse made clear that *“sulfamic acid or other salts of sulfamic acid **may be substituted for and utilized equally as well as the***

ammonium sulfamate of the examples" (page 3, left side, ln 25-29). And furthermore, Woodhouse stated that "*sulfamic acid may be **equally as well substituted** for its ammonium salt.*" (page 2, right side, ln 57-59).

When Woodhouse uses sulfamic acid and other salts of sulfamic acid, he includes the use of a **variety of "nitrogenous" compounds** including nitrates . . . ammonium salts of inorganic acid, such as ammonium chloride, ammonium nitrate and ammonium sulfate, ammonium salts of organic acids, such as ammonium formate and acetate; and organic nitrogenous materials such as urea, acetamide, amines and amino acids." (page 2, left side, ln 49-59).

10. OPTIMAL pH FOR AMMONIATION OF SUPERPHOSPHATE. According to Woodhouse, there was a need for the fertilizer industry "*of adding inorganic nitrogen to superphosphate by **treating the same with free or uncombined —ammonia that will react with the acidic components of the superphosphate*** (page 1, left side, ln 12-15)." In Harvey (US 1,948,520), **ammonia neutralizes free acid** (page 1, left side, ln 10-15). In Bruijn and Mathijs (US 2,555,634), **ammonia is the neutralizing agent and the pH of the reaction mass is maintained between about 6 and 8** (column 4, line 18-21). Clearly, ammonia, from ammonium sulfamate, is to be reacted out with superphosphate, and the final fertilizer composition in Woodhouse has no mixture of salts of sulfamic acid.

According to Moose (US 2,033,389), in the reaction of ammonia and phosphoric acid for the production of ammonium phosphate, pH affects size of the crystals of ammonium phosphate and the tendency to adhere to metallic surfaces. **At low pH the crystals are small and irregular and adhere firmly to metallic surfaces of the saturator.** With the pH between 7-7.4, "*the crystals have a tendency to crystallize with a minimum amount of occluded impurity, giving a very pure product*" (page 2, left column, ln 24-31).

11. FERTILIZER OR HERBICIDE. For 50 years, ammonium sulfamate has been registered at EPA as herbicide. Small amounts of **unreacted ammonium sulfamate** in

the ammoniation of superphosphate could turn the final mixture into a phytotoxic material for plants. No commercial product is available based upon a mixture of fertilizer and a well known herbicide, such as ammonium sulfamate.

12. TEACHING AWAY. The Woodhouse invention involves the use of a nitrifying agent, ammonium sulfamate, which **increases the formation** of ammonium salts and ammonium phosphate salts. This first reaction step, the ammoniation of superphosphate, also results in metallic ammonium phosphate which **lowers the solubility and availability** of bivalent metallic nutrients. The ammoniation of phosphatic materials, effectively, **neutralizes excess acid**. Thus, Woodhouse adds ammonium sulfamate in the first of three steps in the fertilizer "mixture" to **increase reactions** that require ammonium-containing sulfamate rather than bivalent metallic containing sulfamate, as the addition of these metals would only increase the insoluble metallic ammonium phosphate. There is also substantial risk that **un-reacted ammonium sulfamate can affect negatively plant growth as herbicide**. Thus, *arguendo*, even if Woodhouse teaches a complete or improved fertilizer, as the Examiner purports, Woodhouse reference would be **teaching away** from such a chemical combination by making **by raising the pH of the fertilizer mixture, by making the release of nutrients slower and uncontrollable in foliar and fertigation or by making it less complete of essential bivalent metals, by lowering the content of bivalent metals in the molecule, either by displacement reaction or by decomposition reaction or by precipitation of bivalent metals from the sulfamate, oxide, sulfate, carbonate, nitrate, etc, and by leaving traces of ammonium sulfamate as phytotoxic material - herbicide.**

13. LOW SOLUBILITY AND SLOW RELEASE. The similarity between Von Locquenghien and Woodhouse inventions is striking. In Von Locquenghien we have diureides of dicarboxylic acids from N-substituted sulfamate and in Woodhouse we have a metallic ammonium phosphate and metallic phosphate derivatives from the ammonium liquor. In both Von Locquenghien and Woodhouse we have products that are highly **insoluble in soil and in foliar applications** and are best used, at best, as

slow release fertilizer. Most importantly, neither Von Locquenghien nor Woodhouse proposed or intended to use fertilizers bivalent metallic sulfamates as ingredients for final fertilizer.

14. NO BIVALENT SALTS OF SULFAMATE. The ammoniation step is essential in the acid neutralization, and **sulfamic acid and ammonium sulfamate is non-exclusive and exchangeable with other ammonium salts**, and where ammonium sulfamate or its equivalent is either fully reacted out or its metallic sulfamate are precipitated out (or in solution as metallic ammonium phosphate). Thus, Woodhouse complete fertilizer is different from our "complete" invention. A throughout reading of Woodhouse invention shows **no sulfamic acid or its salts in the final composition.**

15. WOODHOUSE DIFFERENT FORMULATION. The Woodhouse definition of sulfamic acid and its salts and acidic fertilizer materials clearly indicates a fertilizer composition different from that claimed:

a) When Woodhouse uses sulfamic acid and other salts of sulfamic acid, he includes the use of a **variety of "nitrogenous" compounds** including nitrates . . . ammonium salts of inorganic acid, such as ammonium chloride, ammonium nitrate and ammonium sulfate, ammonium salts of organic acids, such as ammonium formate and acetate; and organic nitrogenous materials such as uread, acetamide, amines and amino acids." (page 2, left side, ln 49-59).

b) When Woodhouse mentions sulfamic acid or its salts, he includes Ca/Mg sulfamate but **his explicit objective is to make nitrifying solutions or liquors based in ammonia** to form ammonium sulfamate so ammonium ends up displacing metals from sulfamates, otherwise Woodhouse won't have the ammoniation of the superphosphate. To avoid metallic displacement and precipitation or to insure the availability of ammonium sulfamate, in Woodhouse's claims, **the preferred nitrifying agent is comprised of sulfamic acid and its salts and fertilizers from the alkaline group** (alkali

metal, alkaline earth metal and ammonium salts). Why? **Bivalent metals suffer from displacement reaction.**

c) In Woodhouse, acidic fertilizer materials are by definition **acidic components of the superphosphate (and double superphosphate)**. All the other fertilizers mentioned in Woodhouse, such as sulfates, nitrates, chlorides, etc, are not meant for ammoniation, i.e., the reaction with sulfamic acid and its salts.

16. Thus, the method of producing a fertilizer comprising of ammonium sulfamate ("sulfamic acid and salts of sulfamic acid") and superphosphate ("acidic fertilizer materials") is a **method of improving the ammoniation (neutralization) of the superphosphate with a wider range of free to fixed ammonia with the ability to mix their products with other macro nutrients**. Therefore, no bivalent metallic sulfamate is mixed in fertilizer composition.

17. Assuming that sulfamic acid and its salts are based in Ca or Mg, Woodhouse fertilizer would be based on an acid superphosphate with elements N, P, Ca, Mg and S. But **large amounts of calcium sulfate (gypsum) would remain insoluble**, which defeats the purpose of the ammoniation reaction.

18. Acidic superphosphate cannot hold some of the other fertilizer mentioned in Woodhouse. For instance ammonium nitrate/sulfate/chloride would react with the acidic components of the superphosphate and make the pH favorable for the formation of metallic sulfamate. In sum, **the acid fertilizer material and sulfamic acid and its salts cannot hold stable a composition with stable nitrate, phosphate and bivalent metallic sulfamates**.

19. If acid components of **superphosphate and sulfamic acid and Ca/Mg (or other metal) sulfamates** are added, then what happens?

a. Woodhouse's method would produce **metallic phosphate (aq)** at low pH, which is not metallic sulfamate. The phosphate would come from superphosphate - $\text{Ca}(\text{H}_2\text{PO}_4)_2$. (Bivalent anions, such as phosphates and sulfates, are **more reactive** than monovalent anions to bivalent metals – reason why we have more calcium sulfate or gypsum instead of calcium sulfamate)

b. Woodhouse's acid fertilizer would be incompatible with ammonium salts, including ammonium nitrate. According to Woodhouse, there would be an instant **neutralization reaction** ($\text{Ca}(\text{H}_2\text{PO}_4)_2 + \text{metallic sulfamate} + \text{NH}_4^+$) and there would also be **formation of ammonium salts, including metallic ammonium phosphate**. Notice that concentrated **metallic sulfamate are only produced at $\text{pH} < 2$** . Such ammoniation of superphosphate is an **exothermic** reaction.

c. In contrast, the present invention provides solutions of phosphoric acid + Ca/Mg sulfamates + monopotassium phosphate + ammonium nitrate stable for 5 years. **When we add phosphoric acid and then salts of sulfamates, there is no displacement of Ca/Mg, even if we add later phosphates and nitrates (including ammonium nitrate).** The **order of placement of acid**, salts of sulfamate and phosphate **prevents the neutralization reaction and the displacement of the metal from the sulfamate.**

d. As we can see from above, if we allow the **neutralization reaction to occur the Woodhouse's final product will have from slightly acidic to alkaline products.** On the other hand, if we don't allow the neutralization pH will remain very low, and we achieve equilibrium in ammonium, phosphate and metallic sulfamates, for extend shelf life. Again, concentrated **metallic sulfamate are not stable at neutral to high pH.**

e. Another major difference between Woodhouse and the claimed invention can also be seen by the energy produced/consumed. **Woodhouse's ammoniation of acid components of superphosphate and ammonia is clearly an exothermic reaction** (page 2, right column, ln 33-35 and see for example US 4,528,021). In our invention, to

add nitrates and phosphates, including ammonium nitrates and monopotassium phosphate, to acidic solution with salts of sulfamate we must add heat to solution, preferably from 20C to 50+C.

20. WOODHOUSE FERTILIZER IS NOT COMPLETE OF MACROS as its N, P, K, Ca, K and S are not in equilibrium. No other existing fertilizer claims to have these elements in one formulation as GroWonders 575-2Ca-1S-0.5Mg. **This formulation is stable for 8+ years.** See below the laboratory analysis.

21. In sum, neither Woodhouse nor Kirk-Othmer discloses nor suggests the use of bivalent metallic sulfamate salts in a fertilizer. John Deere also fails to correct the deficiencies of Woodhouse and Kirk-Othmer. Hence, this ground of rejection is unsustainable and should be withdrawn.

Claims 111-117 stand rejected under 35 USC 112, first paragraph, as ostensibly failing to comply with the written description requirement.

21. The examiner speculates that *"disclosure does not reasonably convey that the inventor had possession of the subjective matter of the amendment at the time of filing of the instant application (p. 5)."* However, the inventor of the present invention had the formulation in commercial form and produced in accordance with the same procedure as recited in the present claims, i.e., the commercial product labeled Hydrofarm Agro 575 with Ca and Mg sulfamates would not be stable without phosphoric acid.

Contrary to the examiner's rationale, Example 5 of the present specification does show the order of preparation of a complete macro formulation. That is, "preparation of complete and stable macro nutrient solution with 80 ml of solution Ca/Mg sulfamate (from example 2) + 15% phosphoric acid 75% **are added** to 120 g of ammonium nitrate, 120 g of calcium nitrate, 80 g of potassium nitrate, 50 g of magnesium nitrate and 110 g of monopotassium phosphate are added to water to form 1 liter solution."

Example 4 is for a supplement product CMS (Ca-Mg-S) that is to be mixed with NPK at diluted form. Example 5 is for a highly concentrated product with all macro nutrients in ONE solution. Clearly, to turn example 4 into example 5, one would add the phosphoric acid.

It is well-settled that there is no requirement under 35 USC 112, first paragraph that claimed subject matter be disclosed in exactly the same language as that of the claims in order to satisfy the written description requirement. More specifically, in order to determine whether later-added claims are supported by the disclosure as originally filed, the test is whether the disclosure as originally filed *reasonably conveys* to the artisan that the inventor had possession of the later-claimed subject matter when the application was filed. Emphatically, the test is NOT whether there is or is not literal support for the later-claimed subject matter in the specification as filed. *Ralston Purina Co. v. Far-Mar-Co., Inc.*, 227 USPQ 177 (Fed. Cir. 1985).

It is clear from the combined disclosure of Examples 4 and 5 of the present specification that one skilled in the art would understand that the present inventor contemplated the addition of phosphate or nitrate salts to a composition consisting essentially of phosphoric acid and one or more bivalent metallic sulfamate salts. Further, having explained this, it is now incumbent upon the examiner to offer reasons why Applicant's exposition of the importance of Examples 4 and 5 is not convincing.

Thus, in view of the above remarks, this ground of rejection is deemed moot

Hence, in view of all of the above remarks, this ground of rejection is believed to be moot.

Claim 116 stands rejected under 35 USC 112, second paragraph, as ostensibly being indefinite.

However, this ground of rejection is deemed moot in view of the above amendment. It is also pointed out that such other salts are described throughout the present specification.

Applicant also wishes to draw the examiner's attention to the general relationship between pH and composition of an aqueous phosphoric acid solution.

pH and composition of a phosphoric acid aqueous solution

For a given total acid concentration $[A] = [H_3PO_4] + [H_2PO_4^-] + [HPO_4^{2-}] + [PO_4^{3-}]$ ($[A]$ is the total number of moles of pure H_3PO_4 which have been used to prepare 1 liter of solution), the composition of an aqueous solution of phosphoric acid can be calculated using the equilibrium equations associated with the three reactions described above together with the $[H^+][OH^-] = 10^{-14}$ relation and the electrical neutrality equation. Possible concentrations of polyphosphoric molecules and ions is neglected. The system may be reduced to a fifth degree equation for $[H^+]$ which can be solved numerically, yielding:

$[A]$ (mol/L)	pH	$[H_3PO_4]/[A]$ (%)	$[H_2PO_4^-]/[A]$ (%)	$[HPO_4^{2-}]/[A]$ (%)	$[PO_4^{3-}]/[A]$ (%)
1	1.08	91.7	8.29	6.20×10^{-6}	1.60×10^{-17}
10^{-1}	1.62	76.1	23.9	6.20×10^{-5}	5.55×10^{-16}
10^{-2}	2.25	43.1	56.9	6.20×10^{-4}	2.33×10^{-14}
10^{-3}	3.05	10.6	89.3	6.20×10^{-3}	1.48×10^{-12}
10^{-4}	4.01	1.30	98.6	6.19×10^{-2}	1.34×10^{-10}
10^{-5}	5.00	0.133	99.3	0.612	1.30×10^{-8}
10^{-6}	5.97	1.34×10^{-2}	94.5	5.50	1.11×10^{-6}
10^{-7}	6.74	1.80×10^{-3}	74.5	25.5	3.02×10^{-5}
10^{-10}	7.00	8.24×10^{-4}	61.7	38.3	8.18×10^{-5}

For large acid concentrations, the solution is mainly composed of H_3PO_4 . For $[A] = 10^{-2}$, the pH is closed to pK_{a1} , giving an equimolar mixture of H_3PO_4 and $H_2PO_4^-$. For $[A]$

below 10^{-3} , the solution is mainly composed of H_2PO_4^- with $[\text{HPO}_4^{2-}]$ becoming non negligible for very dilute solutions. $[\text{PO}_4^{3-}]$ is always negligible.

Finally, Applicant notes the examiner's comments at pages 2-3 of the Official Action to the effect that Applicant's transitional claim language in claims 104 and 111, i.e., "consisting essentially of" is interpreted as "equivalent to 'comprising'". See page 2.

However, Applicant asserts that the examiner's interpretation is erroneous for two reasons.

First, it is well-settled that a claim preamble term may be a limitation to a claim if that term is structural and not a mere statement of intended use or benefit.

Coming Glass Works v. Sumitomo Elec. U.S.A., Inc. 9 USPQ2d 1962 (Fed. Cir. 1989).

Clearly, the term "acidic" in the preamble of claims 104 and 111 is a structural requirement of the claimed compositions. Hence, the term is a claim limitation for both claims 104 and 111.

Second, it is, therefore, clear that the term "consisting essentially of" in both claims 104 and 111 would exclude any compounds, compositions or substances that would eliminate the acidic nature of the claimed compositions and, thus, render them basic as in Woodhouse. Tautologically, it is the acidic nature of the claimed compositions that presents an important-and patentable-distinction over Woodhouse.

Applicant appreciates the many distinctions noted above between the claimed invention and Woodhouse. However, two fundamental distinctions must be emphasized.

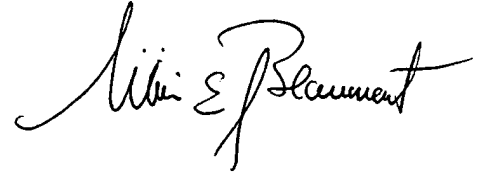
First, Woodhouse does not assert that bivalent metallic sulfamates can be used to react with superphosphate with the product thereof being mixed with other fertilizers. Rather, this assertion is made only for ammonium sulfamate. That is, bivalent metallic sulfamates, individually and/or combined with sulfamic acid, cannot neutralize the excess acidity of the superphosphate. On the contrary, it would further lower the pH of the superphosphate. Woodhouse effectively equates sulfamic acid and its salts with ammonium sulfamate or can be substituted by any other related ammonium salt, and that ammonium from the ammonium sulfamate is supposed to react with acidic compounds of superphosphate in a neutralization reaction.

Second, regardless of whether Woodhouse employs bivalent metallic sulfamates or not, the neutralization and displacement reactions produce neither bivalent metallic nor ammonium sulfamates. During the neutralization reaction, ammonium and other cations would turn into ammonium or other cationic sulfates; and during the displacement reaction, either metallic ammonium phosphate or metallic phosphate would be made resulting in insoluble products, unavailable for plant nutrition. Thus, the final mixture with other fertilizers cannot hold either bivalent metallic or ammonium sulfamates.

Clearly, one skilled in the art would be neither motivated nor enabled to attain the claimed invention, and would, in fact, be led away therefrom by Woodhouse.

Accordingly, it is believed that the present application remains in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, reading "William E. Beaumont". The signature is written in a cursive style with a large, stylized "W" and "B".

William E. Beaumont
Reg. No. 30,996
Juneau Partners